G. damarensis, a white-spotted form, certainly occurs in Angola, for the British Museum contains a specimen collected there by Dr. Welwitsch, and some of the forms may be referred to this species; but most of the specimens are rather young for determination. *G. hottentottus*, *G. damarensis*, and *G. Bocagei*, having the naso-frontal suture of somewhat the same pattern, the skulls are difficult to distinguish when young. The occipital spot is undoubtedly a variable character, as I find in normally unspotted forms, such as *G. Nimrodi*, an occasional specimen with a small white spot, and in the normally large-spotted form, *G. Darlingi*, an occasional specimen turns up with only a very small white spot; thus it may be possible outwardly to almost perfectly match specimens of these two otherwise very widely distinct species; this only shows how necessary it is to have far larger series of these animals before we can say whether age, sex, or season has anything to do with their varying exteriors.

XXXVI.—*On the Excretory Organs and Blood-vascular System of* Tetrastemma graecense, *Böhmig*. (A Provisional Communication.) By Dr. L. Böhmig, of Graz *.

The freshwater Nemertine which I observed in the year 1892 in a reservoir in the Botanical Gardens here I have again discovered in greater numbers in the same place, and have been enabled to submit it to closer investigation. I devoted my attention especially to the excretory and sexual organs, and now give a short statement of some of the results of my researches.

Although the plates for my memoir on *Tetrastemma graecense* were finished a considerable time ago, the publication of the paper itself has been greatly delayed, partly in consequence of my professional duties and partly owing to the examination of a land Nemertine found in the hothouse of the local Botanical Gardens.

In specimens to which a moderately strong pressure has been applied there is readily recognizable on each side of the body a system of clear ramifying canals, from 4·26 to 11·36 μ in diameter, which communicate one with another and permeate the animal throughout its entire length. In the anterior extremity of the body, in the region of the brain and in front of it, I observed only a single canal of larger size, which was disposed in manifold sinuosities and loops, and ultimately became broken up into a fine close-meshed network of very small canalicules; at the posterior end of the body I failed to discover a terminal plexus of this kind. Into the coarser

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network of canals, as well as into the finer one in the cephalic region, there open numerous fine straight canaliculcs, upon which lie the terminal organs, which are easily recognizable owing to the active movements of their cilia-flames. Information as to the finer structure of the excretory organs is afforded by microscopical sections. In these may be observed on each side, chiefly towards the dorsal surface and laterally to the intestine, a ramifying cord of cells of varying size, from which, however, isolated branches also pass over to the ventral side. There is no communication at any point between the two lateral cords of cells, although they sometimes approach so closely as almost to come into contact.

For the sake of clearness it appears to me to be advantageous from a descriptive point of view to distinguish three sections in the excretory organs—namely, the end-canaliculcs, upon which lie the terminal organs, the connecting canals, and the main canals.

The first-mentioned lie for the most part close beneath the dermo-muscular tube, and further on in immediate proximity to the wall of the intestine; their transverse diameter amounts to about 3 to 5 μ. Their wall consists of flat cells, which take but a slight stain, and the respective limits of which can only be made out with difficulty. The cell-plasma is homogeneous in character or else finely granular, not infrequently of greater density on the outer and inner surfaces, a fact to which the somewhat greater stainability of these cells is probably also to be ascribed. I never observed cilia or more strongly developed single flagella in the case of these cells.

The connecting canals which join the end-canaliculcs are distinguished from the latter not only by greater thickness, but also by the fact that the cells forming their boundaries possess a cylindrical shape and a more strongly granular, not infrequently finely vacuolate, protoplasm, which is capable of taking a more intense stain. These cells appear always to bear cilia, though I have succeeded in recognizing the delicate fringe of cilia only in certain preparations.

Lastly, if we examine sections through the main portion of the organ, we observe, in the first place, a complex of cells which is traversed by canals in all directions. Closer study, however, shows us that even here each canal has its own cellular wall, but that the cells of the different canals often lie extraordinarily close together, and that there are tracts where the limits of the cells are not recognizable. These cells vary considerably in size, but they are always larger than those of the connecting portions. Their plasma is granular and very frequently interspersed with a large number of vacuoles; they, too, in life probably possess a clothing of

cilia, although it was only now and then that I could perceive this distinctly in prepared sections.

The knobbed terminal organs, the outer surface of which is smooth, either rest with a relatively broad base upon the end-canalicules, which not infrequently ramify, or else the portion turned towards the canalicule is drawn out like a stalk; in the former case they are more bulky in shape, in the latter more elongate. Each terminal organ is closed at its free end by two flame-cells (more rarely one), from which delicate strands of plasma radiate into the mesenchyma; in the formation of its wall several—as it seems to me from three to five—cells take part, which in structure resemble those of the end-canalicule. In general it may be said that the end-canals open into the main canals not directly, but by means of the connecting portions; yet I have also seen a direct communication between the two.

The number of the excretory pores could not be determined with certainty in the living animal, but on examining the series of transverse sections from two individuals it was found that in the first case there were five pores on each side and in the second six on the one side and three on the other. The pores are always situated dorsally and at irregular distances one from another; in the case of the specimen, too, which possessed five pores on each side, those of the right side did not correspond with those of the left.

At the points at which excretory pores occur the excretory organ is applied closely to the dermo-muscular tube and the short efferent duct bores its way straight through dermo-muscular tube, basement membrane, and epithelium.

A more intimate relation between the nephridia and the blood-vessels, such as has been demonstrated by Bürger in the case of marine Metanemertines, especially *Drepanophorus*, does not exist in *Tetrastemma graecense*.

The blood-vascular system consists of three trunks, two lateral vessels and a dorsal vessel. The latter opens in front into the right lateral vessel close behind the brain, behind into the anal commissure between the two lateral vessels.

The wall of all these vessels is formed by an internal endothelium, a muscular sheath, and an outer layer of mesenchyma cells arranged in epithelial fashion. Now between the endothelium and muscular sheath large cells of hemispherical form and peculiar structure thrust their way; in the condition of diastole these cells stand out like knobs from the wall of the vessel, but in that of systole they project into its lumen. Since two cells of this kind always lie directly opposite to one another, or nearly so, they are able in systole to close the lumen almost completely and prevent a backward flow of the blood.